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Co-expressivity of speech and gesture: Manner of motion in Spanish, English, and Chinese[1]

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0. Abstract

Languages such as Spanish and English differ in how each lexically packages and syntactically distributes semantic content related to motion event expression (Talmy 1985, 1991). Comparisons of spoken Spanish and English (Slobin 1996, 1998) reveal less expression of manner of motion in Spanish. This leads to the conclusion that 'thinking for speaking' in Spanish involves less conceptualization of manner. Here we assess speech-associated thinking about manner on a broader basis by examining not only speech but also the speech-synchronous gestures of Spanish, English, and Chinese speakers for content related to manner of motion. Speakers of all three languages produce manner-expressive gestures similar in type and frequency. Thus, motion event description may in fact involve conceptualization of manner to roughly the same extent in all three languages. Examination of gesture-speech temporal synchrony shows that Spanish manner gestures associate with expression of the ground component of motion in speech.

We consider these findings in relation to two assertions: (1) gesture compensates for content speech lacks, (2) gesture and speech 'jointly highlight' shared or congruent semantic content. A compensation interpretation of the Spanish manner gestures raises questions about the role of gesture data in studies of thinking-for-speaking, generally. Further evidence from a follow-up study, in which narrators had no visual exposure to the cartoon, lead us to interpret Spanish speakers' manner-expressive gestures as an instance of joint highlighting. This interpretation accords with McNeill's (1992) "rule of semantic synchrony" between speech and gesture, one of the foundations of his 'growth point' theory of language production (McNeill 1992; McNeill and Duncan 2000). We discuss some implications of a joint highlighting interpretation for analyses of thinking for speaking and for lexical semantic theory.

1. Introduction and overview

Speakers of all languages gesture spontaneously when they converse, tell stories, or narrate events. Many of these gestures manifest semantic content; for instance,

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they may iconically represent actions and entities that speakers refer to in narrative discourse. What interests many researchers about gestures is their potential as a communicative resource. Indeed, a principle of *compensation* is often applicable to the gesture-speech relationship (Taub, this volume). Gestures may communicate propositional, semantic, and other content for which the resources of the spoken language are inadequate (Kendon 2000). There is little disagreement that gestures have a communicative function. However, gesture is an exceedingly heterogenous domain of behavior. A principle of compensation by itself falls short of explaining all of the patterning we observe.

Compensation, for instance, does not explain something that characterizes a great deal of the gesturing that occurs in narrative discourse; namely, the significant degree of 'overlap' in the meanings expressed by gestures and speech during the intervals in which they synchronize. Much gesture production occurs in tight synchrony with speech, as it is linked to the prosodic and rhythmic structure of language (Tuite 1993). Components of motion such as path, manner, figure, and ground are often simultaneously expressed in the two modalities. For instance, if an English speaker describes a cat climbing up and a spontaneously-produced gesture synchronizes with her speech, the gesture is very likely to be some kind of iconic depiction of a figure climbing upward. Her two hands may represent the cat's paws. They may move alternatingly as the cat's paws would in climbing. They may also move generally upward in front of her body. Certain aspects of the relationship between the two modalities, we see, are better characterized as *joint highlighting* of semantic content, rather than as compensation by one modality for the expressive limitations of the other.

Some studies have focused on this tendency of gesture to track the semantic content of speech. Such work is in accord with a theoretical claim that, in each unit of language production in connected narrative discourse, co-produced speech and gesture are two simultaneous aspects of a single idea unit (McNeill 1985, 1992). We claim this unity despite obvious and significant differences between the two modes of expression, in terms of the way each structures meaning. Gesture is often imagistic, analog, and synthetic, while the speech 'code' is analytic, consisting of a linear-sequential arrangement of arbitrary units that derive from paradigms of categorial oppositions. McNeill has proposed a "rule of semantic synchrony" to capture the generality of the phenomenon of overlapping meanings in co-produced speech and gesture (McNeill 1992:28). Some cross-linguistic comparative research indicates that speakers of different languages gesture differently about events they describe, in ways that are semantically aligned with how their languages constrain them to speak about those events (Kita 2000; Mueller 1994; McNeill and Duncan 2000).

Any psychological theory of speaking that attempts to deal with the fact of speech-synchronous gesture must acknowledge and account for the significant semantic overlap between the two modalities. Here we will propose also that lexical semantic theories of meaning can profit from careful consideration of exactly how the semantics of the two modalities link up.

2. The present study

The analyses of speech and gesture reported here draw on the linguistic typological framework established in Talmy's cross-language comparisons of motion event expression (1985, 1991) and elaborated in Slobin's (1987, 1995, 1996, 1998) comparisons of the spoken and written forms of a number of languages, including Spanish and English. Talmy distinguishes 'verb-framed' and

'satellite-framed' languages, of which Spanish and English, respectively, are instances. The typology concerns which sentential constituent typically contains a lexical item expressive of the path component of motion. In Spanish sentential main verbs are typically path-expressive. *Entrar* 'enter' and *subir* 'ascend' are examples. In English, main verbs are more often motion- and/or manner-expressive, with path of motion expressed in satellites to the verb; for example, *go up*, *climb out*, *come down*, and *run in*.

Slobin (1998:7) notes that English has a "huge lexicon" of manner-expressive verbs compared to Spanish; further, that in spoken Spanish there are grammatical barriers, of sorts, to the use of manner verbs. In many Spanish discourse contexts it is cumbersome to include expression of manner of motion, as it must typically be incorporated using adjuncts to the verb. Such additions result in more elaborated constructions than may be rhetorically suitable in many discourse contexts. Slobin (1996, 1998) notes that manner, therefore, is frequently left out of Spanish motion event descriptions. On the basis of such evidence, Slobin builds a case for the existence of a cross-linguistically variable cognitive process of 'thinking for speaking.' This is the process by which thinking is structured into forms appropriate for spoken language production. Slobin claims that the dearth of manner-expression in spoken Spanish is evidence that thinking for speaking in that language involves less conceptualization of manner than it does in English. He claims further that experience with speaking Spanish over a life time results in a tendency among these speakers to attend less to manner of motion in the world, it being less "codable" in that language (1995, 1998:4).

These analyses have been based solely on speech and its written forms. Analysis of speech-synchronous gesture suggests itself as a method for broadening the examination of thinking for speaking. Attempts to assess the cross-linguistic variability of this process, that undertake to examine only speech and its written forms, carry a risk of circular reasoning.

> A skeptical view […] could hold that these differences operate only at the level of linguistic expression. To counter such a view, some way is needed to externalize cognition in addition to language. […] we consider speech and gesture jointly as an 'enhanced window' onto thinking and show how the co-occurrences of speech and gesture in different languages enable us to infer thinking-for-speaking in Slobin's sense. (McNeill and Duncan 2000:142)

We examine videotaped, unrehearsed, cartoon story narrations collected from adult Spanish, English, and Mandarin Chinese speakers; more than 100 narrations in all. Each of the speakers watched a 6.5-minute, animated cartoon about a cat and a bird and was then audio-videotaped telling the story of the cartoon to a naïve listener. We sample descriptions of events in the cartoon eliciting stimulus that involve a figure moving along a path in relation to a ground. In each of these, a particular manner of motion is an element of the depicted event. With one exception, the analyses we report below are limited to descriptions of just two of the motion events depicted in the cartoon eliciting stimulus. In one, the cat climbs up a drainpipe on a building. In the other, the cat rolls down a hill after having swallowed a large bowling ball.

We will describe a within-language (Spanish) difference in the way these two events are described, related to use of manner-expressive lexical items. Note that the 'climbing' and 'rolling' events each comprises the same set of motion event components—figure, path, manner, and ground. On the basis of Talmy's typology, therefore, we have no *a priori* basis on which to predict within-

language differences in the lexical-semantic and syntactic resources speakers will use to fashion descriptions of these events. We also observe cross-language differences in gesture form and gesture-speech synchrony. We will claim that these differences are informative concerning Spanish thinking for speaking.

3. Descriptions of rolling down a hill

The speech-synchronous gestures of the English, Spanish, and Chinese speakers, below, are representative of the range of gestural forms we encounter in our narration data. These excerpts also illustrate the consistency with which similar semantic content appears simultaneously in the two modalities. In (1), an English speaker performs a two-handed gesture synchronized with the spoken phrase *rolls on down*, in which the hands trace vertical circles alternatingly while moving along a path slightly downward and away from her body.

(1) h**e rolls on down** into a bowling alley

(2) va **rodando** va rodando y entra a un establecimiento de boliche
goes **rolling** goes rolling and enters to an establishment of bowling
he goes **rolling**, rolling and enters a bowling place

(3) ta jiu **gun gun gun gun g**un gang-hao gun-jin yi-jia bao-ling qiu guan
he then **roll roll roll roll r**oll just-good roll-enter a-CL bowling ball place
then he **rolls and rolls and r**olls, then rolls into a bowling alley

In (2), a Spanish speaker, in exact synchrony with *rodando* 'rolling,' traces a path rightward with his right hand in front of his body. The hand flaps up and down as it moves, depicting path and a rolling manner. In (3), a Chinese speaker moves both hands from left to right and downward, the fingers wiggling. This path-manner gesture synchronizes with the reduplicated manner verb *gun* 'roll.'

These are all examples of a type of multi-directional gestural motion we observe when narrators describe cartoon events depicted as having manner of a repeating, alternating, or agitated kind; for example, climbing, flying, and tip-toeing. In each case, the gesturing body part moves repetitively in more than one direction. The movement may be revolving, up and down, side to side, or multi-directional in an erratic pattern. In our analyses,'agitated' gestural motions such as these are interpreted as expressions of manner of motion.

Two issues concerning the narration excerpts above will be relevant to our cross-language comparisons. The first concerns the temporal synchrony of speech and gesture. The speech in each example that is rendered in bold face represents the interval during which the 'stroke' phase of the co-occurring gesture is executed. A gesture stroke is the phase within the overall gestural movement during which the gesture's semantic content is interpretable (see Kendon 1980:212; McNeill 1992:25).[2] The three excerpts are representative of what we observe across the three languages in regard to speech-gesture synchrony. When manner-expressive iconic gesture strokes co-occur with utterances containing

[2] We examine the synchrony of stroke phases with speech closely on videotape with the aid of professional-grade VCRs. Such equipment makes it possible, in slow-motion mode, to listen to the audio portion of the recording while watching the video. The ability to slow the media down to frame-by-frame viewing speed without loss of access to the audio track is essential for the type of analyses we report here.

manner-expressive lexical items, the two expressions of manner typically synchronize, often quite precisely.

The second issue is that the spoken portion of the Spanish excerpt, similarly to the English and Chinese, includes a manner-expressive lexical item, *rodando* 'rolling.' Manner-expressive terms are frequent in the Spanish speakers' descriptions of this cartoon event. Twenty-two, or 68%, of thirty-two Spanish speakers who recalled and narrated this event included one or more manner-expressive lexical items in their descriptions of it; thirty-two, 86%, of thirty-seven English speakers did so. The most common grammatical construction used among the English speakers is the phrase *goes rolling*; among Spanish speakers, *va rodando* 'goes rolling,' an analogous construction. We also see other manner verbs; for instance, *bounce* in English, *botar* 'bounce' in Spanish. Thus, despite an 18% difference between the speaker groups in use of manner verbs here, the spoken descriptions of the 'rolling' motion event are not dissimilar. For comparison, Slobin (1998:6) reports in regard to one motion event in the 'frog story' narrations that involved manner of motion, none of the Spanish speakers' verbs was manner-expressive, while 32% of those used by English speakers were.

4. Descriptions of climbing up a pipe

4.1 Speech

The utterances below illustrate typical verb use in spoken descriptions of our other target motion event. These descriptions illustrate how the three languages form something of a continuum with respect to the tendency to use manner-expressive verbs. This fact will prove useful, presently, when we consider the hypothesis that gestural manner compensates for manner missing from speech.

(4) Sylvester climbs up the drainpipe gets to the top

(5) Silvestre empezó a subir por un tubo de desagüe
sylvester he-begin to to-ascend via a pipe of drainage
sylvester begins to ascend via a drainpipe

(6) mao kai-shi cong shui-guan pa pa-pa-pa pa-shang-qu
cat begin via drainpipe climb climb-climb-climb climb-up-go
the cat starts to climb the drainpipe he climbs and climbs he climbs up

English speakers often use the manner-expressive verb *climb* in one or more of the phrases they put together to describe the cat's ("Sylvester") ascent. Often a phrase like this combines in sequence with one or more additional phrases incorporating a non-manner-expressive verb, as in (4), above. In addition to the verb *get*, other non-manner-expressive verbs that occur in the English descriptions of this event include the verbs *go* and *come*. Neither is it unusual for English speakers to use *go* and *come* with no manner adjunct in their descriptions of the 'rolling' event. On the basis of descriptions of these two events, as well as others in our English sample, we can say that English offers its speakers a fair degree of flexibility to choose non-manner-expressive verbs to describe all or part of both the 'climbing' and the 'rolling' motion events in the cartoon. Examples include, *as he's going up*, and, *he comes out the bottom of the drainpipe*.

In contrast, the Spanish descriptions of the 'climbing' event are almost without exception organized around path verbs. In this, these descriptions are

more representative of our Spanish narration data in its entirety than were these speakers' decriptions of the 'rolling' event. Use of *trepar* 'to climb' to describe this event occurs only twice in almost 40 Spanish narrations. This in spite of the fact that the cat climbs up the pipe several times during the cartoon, providing Spanish speakers with ample opportunity to use that manner-expressive verb, were they so inclined. For this event, Spanish speakers prefer path-expressive *subir* 'to ascend.' *Entrar* 'enter' and *meter* 'enter'/'insert' also occur. Therefore, here, our Spanish narration data are quite in accord with Slobin's (1998) findings.

Chinese is among the satellite-framed languages according to Talmy's typology (Talmy 1985; cf. Slobin and Hoiting 1994:102). In our Chinese-language data, path-expressive verbs and deictic verbs are rarely deployed as the main verbs of motion-event descriptive utterances. Further, as (3), above, and (8), below, illustrate, there is often repetition of manner verbs within utterances in ways not attested in the Spanish and English data. As a consequence, there sometimes seems almost a super-abundance of manner coloration in Chinese motion event descriptions.[3] The utility of the Chinese narration data for our comparison of speech and gesture has to do with these speakers' very heavy use of manner verbs, compared to Spanish and English speakers. In this respect, Chinese is at the opposite end of a continuum from Spanish, with English in between. The language has many manner verbs and appears to make the use of them almost obligatory in narrative discourse contexts like this one. This difference will prove useful, presently, when we examine the gesture data for evidence in support of the gesture-speech compensation hypothesis.

4.2 Gestures that express 'climbing' manner

Now we examine the three speaker groups' manner gestures in the context of descriptions of the 'climbing' target motion event. The English and Chinese descriptions, (7) and (8), provide further illustration of the phenomenon of gesture-speech semantic synchrony. Observe how precisely the motion event component-expressive gestures synchronize with speech expressive of the same components, both manner and path.[4] In (7.1), this English speaker's right hand bumps up and down, an 'agitated' movement expressive of manner, while moving upward. In (7.2) the right hand changes to an index point up and continues, minus the bumping, on the same upward path, now moving through the speaker's left hand, which is in the shape of the letter *C*, an iconic representation of the drainpipe.

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[3] We note two features of our Chinese discourse data that may relate to the abundance of manner-expression. Example (6) illustrates both: a) the prominent manipulation of aspectual distinctions—incipient, progressive, and perfective—that leads to repetition of manner verbs within event descriptions, and b) the very common use of directional verb complement (DVC) constructions, which relegate path-expressive and deictic verbs to a subordinate role in utterance-final position. There appear to be some limitations on the use of the latter verbs outside of DVCs.

[4] We employ the following typographic conventions for annotating the narration transcripts. Asterisks (*) indicate self-interrupted speech; forward slashes, brief silent pauses; angle-bracketed text (<…>), filled pauses or syllable lengthening; curly-bracketed dots {…}, unintelligible syllables. Square brackets define individual gesture movements against co-occurring speech. Gestures can 'nest' and this is indicated with nesting square brackets. Gesture stroke phases are in bold face. Underlining represents intervals of temporary cessation of gestural movement, in-place, called gesture 'holds.'

(7.1)[5] [[/ so he **starts climbi**][ng {manner+path}

(7.2) / **through** the rainpipe /]] {figure/ground+ground+path}

(8.1) [/ **pa shui-guan-de wa**][[**i-bian** {manner+path+figure}
[/ **climb drainpipe-POS out][[side**
[/ **climbs the drainpipe's out**][**side**

(8.2) **pa pa pa**] {manner+path}
climb climb climb]
climbs and climbs]

(8.3) [pa-**shang**]]-qu {path only}
[climb-**up**]]-go
[climbs **up**

In (8.1) the Chinese speaker's two hands flap alternatingly, moving up. The left hand continues on by itself in (8.2). Note that these two manner gestures occupy a long interval, during which the manner verb *pa* 'climb' is uttered four times. (8.3) illustrates how gesture can 'surgically' target an element of speech. The bold face shows that the path-only gesture stroke—an index point moving up—skips the manner-expressive verb to synchronize with the path-expressive, *shang* 'up.'

In the Spanish, we see a different situation. In (9), as with descriptions of the 'rolling' event, a Spanish speaker produces manner gestures in association with her motion event description. The difference here, of course, is that the manner gestures now synchronize with utterances that contain no manner verbs. Two path-expressive verbs are used to describe how the cat gets to the bird's window via the drainpipe. The speaker gestures non-stop through this spoken sequence. This is not unusual when speakers are fully engaged in the narration task.

(9.1) entonces busca la ma][ner**a /**_/_][de e**ntra**][r {ground}{path+ground}
and then he-look-for the ma][nn**er /**_/_][of to-**ent**][er
and then he looks for the w][**ay /**_/_][/ to **ent**][er

(9.2) **/ se met**][[**e** {manner+figure+path}
/ REFL he-ent][[**er**
/ he ent][[**ers**

(9.3) **por el**] [**desagüe**_/_]] {manner+figure/ground+path+ground}
via the] [**drainpipe**_/_]]
via the] [**drainpipe**_/_]]

(9.4) [/ **sí**?] {ground+path}
[/ **yes**?]
[/ **yes**?]

[5] Starting from this point, the semantic content of the speech-synchronous gesture, as components of motion, will be indicated in curly brackets at the right margin. The notation 'figure/ground' indicates that the gesture in some way makes the relationship between the figure and ground components explicit.

(9.5) [de**sagüe entra** /] {manner+figure/ground+path+ground}
[dra**inpipe he-enter** /]
[dra**inpipe enters** /]

We will discuss four issues that emerge from consideration of this Spanish narration excerpt. First, the speaker uses no manner-expressive verbs or verb adjuncts. Second, four of her seven gestures are manner-expressive. Third, all the occurrences of manner in gesture temporally synchronize with an interval of speech that is somehow expressive of the ground component of motion (*desagüe* 'drainpipe'), or of the relationship of ground to figure and path. The two path-expressive verbs, *entrar* 'enter' and *meter* 'enter'/'insert,' for example, encode a path/figure-ground relationship, as does the preposition *por* 'via.' Fourth, this speaker's manner gestures are of two types, one of which is a gestural form unattested in the other speaker groups.[6] We see the form in the first bracketed gesture of (9.3). The left hand curves in the shape of the pipe, the ground component. The index finger of the loose right hand points up as the hand executes a repeating, spiraling, 'corkscrew' motion upward. The second gesture in (9.3) repeats the performance, as does (9.5). In (9.2) the speaker flaps her hands alternatingly, moving them up, representing path and manner of motion.

This is quite a lot of gestural manner, especially considering the absence of manner verbs in the accompanying speech. In the next section we compare Spanish with English and Chinese in terms of overall frequency of manner gestures. We ask whether manner gestures of the sort produced by the Spanish speaker in this case function generally to compensate for the lower use of manner verbs in Spanish. Following that, we focus on the linkage, in gestured and spoken expression, between the manner and ground components of motion in Spanish.

5. Overall frequency of manner in gesture, all three languages

Earlier, we described a continuum relating the three languages, in terms of relative amounts of manner expression in speech. The narration excerpts given so far demonstrate that some gestural expression of manner is a factor in all three languages. However, we might imagine that Chinese speakers produce fewer such gestures overall, since they do not really 'need' to gesture about manner of motion, it being abundant in their speech. A gesture-speech compensation claim is supported if manner-expressive gestures are most frequent in the Spanish narrations, least frequent in the Chinese narrations, with English somewhere in between. Counts of the manner-expressive gestures that speakers of the three languages produce with their motion event descriptions are presented in (1A).[7]

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[6] This sequence has been discussed previously in print (McNeill 2000; McNeill and Duncan 2000). Here we provide further details, in order to highlight the linkage between gestured manner and spoken ground, also the link between manner and ground in the gestures themselves. This one speaker's manner gestures have been described as a diffuse 'fog' (McNeill 1997) blanketing the sequence. That description may obscure the features that interest us in this case; namely, the rather precise articulation of the two types of manner-expressive gestures in relation to ground-expressive speech; also, in relation to the non-manner-expressive gestures with which they are interpolated.

[7] These counts draw on a slightly more comprehensive sampling of *five* target motion events, rather than just the two that are largely the focus of this paper. These events are (1) cat runs across street, (2) cat climbs up on outside of drainpipe, (3) bird flies out of cage, (4) cat climbs up inside drainpipe, (5) cat and ball roll down hill. The sample was limited to twenty cartoon narrations from each speaker group. We selected from among the Spanish and Chinese speakers those who were least proficient in English as a second language. Note also that, if the counts of manner

Table 1A. Manner gestures: Overall counts and the content of co-occurring speech. (20 speakers each; Spanish, English, Chinese)

SPEECH	SPANISH	ENGLISH	CHINESE
ground / figure / path	42	14	15
motion (+path / ground)	9	5	1
manner	13	13	30
manner + path / ground	7	24	30
other	17	2	12
total manner gestures	**88**	**58**	**88**

Spanish and Chinese speakers produce the same number of manner gestures. Each group of twenty speakers produced a total of 88. The twenty English speakers produced a total of 58. That Chinese and Spanish speakers both gesture quite a lot about manner of motion is inconsistent with the compensation claim, as stated in terms of relative amounts of manner expression in accompanying speech.

If compensation is not a factor, then we might expect the number of manner gestures to be about the same across the three groups, yet the count for English is just 66% that of the others. The most likely source of this disparity is the differing prosodic structures of the three languages, as this relates to how 'idea units' are packaged for production. As Tuite (1993) has noted (see also Kendon 1980; Nobe 1996), gesture stroke production reflects not so much the clausal as the prosodic structure of a language. The significant factor in occurrence of gesture strokes is the patterning of intonation and pauses within individual utterances; specifically, gesture stroke phases tend to track peak prosodic emphasis. Inspection of individual speech-gesture productions in the three languages reveals that the difference in gesture counts, above, is likely at least in part attributable to the difference between English and Spanish utterances illustrated in (10) and (11).

(10) the cat **comes rolling** out {manner+path}

(11) [sa**le rodando**] [/ **el gato**] {manner+path}
[he-ex**it rolling**][/ **the cat**]
[he ex**its rolling**][/ **the cat**]

Examples (6) and (8) from the Chinese data, cited earlier, reveal a pattern that contrasts with English in a similar way. A comparison of rates of gesture across these languages properly takes the motion event as its unit of analysis. Such a comparison reveals a higher ratio of gestures per unit, overall, in Chinese and Spanish than in English. While it is true that there are two manner gestures in (10) to just one in (11), in both cases the expression of manner is relevant to a single proposition expressive of one motion event. On this metric, gestural manner may be considered to be roughly equal across the three languages.

5. The link between manner and ground components of motion

5.1 Direct synchrony

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gestures overall seem low, given the size of the speaker sample, be aware that speakers do not reliably recall every cartoon motion event, sometimes do not gesture at all, or, of course, gesture about various other components of motion.

(1B) presents the percentages of manner-expressive gestures in the three languages that synchronize with manner-expressive speech *versus* non-manner-expressive speech. These percentages reflect the data presented in (1A), collapsed to highlight the manner/non-manner distinction.

Table 1B. Manner-expressive gestures: Percent occurrence with ground, manner, or 'other' in speech. (20 speakers of each language)

SPEECH	SPANISH	ENGLISH	CHINESE
manner (+path/ground)	23 %	64 %	68 %
ground/figure/path (motion)	58 %	33 %	18 %
other	19 %	3 %	14 %

The shaded portions of the table reveal that, in Spanish, the largest portion of manner-expressive gestures synchronize with ground-expressive speech, while in both English and Chinese, the largest portion of these gestures synchronize with speech containing a manner verb or adverbial.

We can cite many examples of the pairing of ground-expressive speech with manner-expressive gestures in Spanish. When this occurs in the context of the 'climbing' event, often the gesture has the upward spiraling 'corkscrew' form described in example (9). There was an instance in that example as well of a gesture, synchronized with *mete* 'enters'/'inserts,' in which the speaker's hands-as-cat-paws flapped alternatingly. That gestural form, too, occurs frequently in our Spanish data. While such 'hand-flapping' is transparently manner-expressive, some readers may question designating the 'corkscrew' gestural form, unique to our Spanish narrators, as also expressive of manner. We make the assignment, here, in accord with our coding convention that any 'agitated' gesture stroke form is manner-expressive. The convention itself derives from empirical observations of a number of languages indicating a reliable association between spoken descriptions of manner and gestural 'agitation.' Also, however, we note that 'corkscrew' and 'hand-flapping' can occur in the same Spanish discourse contexts. This suggests similarity of expressive value. The fact of occurrence of 'hand-flapping' where there is no manner verb is evidence that speaking-associated conceptualization of manner is possible for Spanish speakers in such contexts. This fact opens the door for the interpretation of 'corkscrew' agitation as manner-expressive.

The 'corkscrew' form has broader significance, however, for our analysis of conceptualization of manner in Spanish narrative contexts. We see this gesture form as a melding of ground and manner. We note that it only appears when our Spanish narrators refer to the cat's ascent on the pipe. The curved spiraling of the 'corkscrew' form seems expressive of the vertically-extended cylindricality of the pipe. One might counter that the form is *only* ground-expressive. We are in a position, though, to compare it to many gestures that occur in contexts where the narrator is momentarily unconcerned with the cat's ascent and is just describing the pipe. None of these displays the spiraling motion. For all these reasons, the inference that the agitated 'corkscrew' motion expresses manner seems justified.

A speech-gesture production from another Spanish narrator may make the general analysis we propose less obscure. In (12) the speaker mistakenly recalls that the ground component of the 'climbing' event was a staircase. His error results in a gesture production that highlights the manner-ground relationship in

the same way, we submit, as the 'corkscrew' highlights it in the case of the descriptions where the ground component is accurately recalled.

(12) [/ **sub**][e por un**as escalera**s /] {path} {manner+path}
[/ **he-asc**][end via **a staircase** /]
[/ **he asc**][ends via **a staircase** /]

A path-expressive gesture synchronizes with the path verb *sube* 'ascends.' The second gesture in the sequence synchronizes with *escaleras* 'staircase' and is another instance of the melding of manner and ground into one gestural form and motion. The speaker's two fingers wiggle alternatingly while moving upward at an angle, suggestive of the manner of ascending—specifically—on a staircase.

We interpret such instances of synchrony of manner- and sometimes manner/ground-expressive gestures with ground-expressive spoken Spanish as suggestive of a 'semantic synchrony' between manner and ground in Spanish thinking for speaking. Given the gestural evidence that a great deal of speaking-related conceptualization of manner occurs in Spanish, these findings of co-produced representations of ground and manner in speech and gesture are the basis for a claim that manner conceptualization in Spanish thinking for speaking builds on the ground component of motion. Seen in terms of the analytic structure of spoken expression, the components of manner and ground, certainly seem distinct. The semiotic modality of gesture, however, lets us see them as less separate in certain contexts, more as two aspects of one kind of motion.

6.2 Sequential links between manner and ground

Examples like (13) are sometimes observed when we analyze motion event expression unfold across a connected sequence of utterances.

(13.1) o sea [**se su**][**be** {path only}
or it-is [**REFL he-asc**][**end**
or it's **he asc**][**ends**

(13.2) **por un**][**tubo /**][{…} es como un **desagüe /**] {ground}
via a] [**pipe /**][{…} it-is like a **drainpipe /**]
via a] [**pipe /**][{…} it's like a **drainpipe /**]

(13.3) [/ **y se sube por allí**] {path+manner}
[/ **and REFL he-ascend via there**]
[/ and he ascends via there]

In between two path-focused spoken descriptions, the speaker produces three speech-gesture combinations expressive of the ground component, the drainpipe. The gestures in (13.2) are all iconic representations of the pipe. The gesture that synchronizes with the speech in (13.1) is expressive only of the upward path of motion. It is an index finger path trace. The gesture that synchronizes with (13.3) is a modified repeat of (13.1). Again, the index point moves up, however this time the gesture incorporates the 'corkscrew' motion, expressive of manner. Here we see how conceptualization of manner can also build sequentially on ground.

7. A follow-up study of Spanish speakers and listeners[8]

Some have hypothesized that the manner gestures of Spanish narrators are direct gestural manifestations of the visual imagery these speakers retain from watching the cartoon stimulus. This is a testable alternative to our proposal that the gestures instead reflect a variety of thinking for speaking in which conceptualization of manner is linked to the component of ground. The cartoon does indeed contain many depictions of exaggerated manners of motion. We conducted a follow-up study with eight native speakers of Spanish to test the visual imagery hypothesis.

The eliciting stimulus was the audio track (only) of one of our main sample of Spanish narrations. We selected a narration that was typical in terms of how the narrator described the two target motion events of 'rolling' and 'climbing.' The 'rolling' event description incorporated *va rodando* 'goes rolling'; the 'climbing' event, *sube por un tubo* 'ascend via a pipe.' The latter also incorporated three utterances descriptive of the static setting, the drainpipe. Four of the eight participants listened twice to the narration on earphones, then told the cartoon story to one of the other four native Spanish speakers.

Thus, the narrators in this instance neither saw the cartoon itself, nor viewed another Spanish narrator speaking and gesturing about it. Our interest, of course, was in whether the narrators in this case would produce manner gestures at all; further, whether the gestures would exhibit the same forms and synchrony with speech as those of the speakers in the main study. Very briefly, analysis of the speech and speech-synchronous gestures revealed a difference only in overall amount of gesture between the two groups; otherwise, the follow-up study participants' performances were similar in speech and in production of manner-expressive gestures. Their gestures exhibited the same range of forms, including the 'corkscrew,' and similar speech-gesture temporal relationships.

8. Discussion

Slobin (1998) assesses Spanish speakers' intuitions concerning the manner-related mental imagery they retain from reading narrative texts in Spanish. Speakers report that they retain very little. Such data are counter evidence to the claims we make here on the basis of speech-synchronous gesture. The gesture data, however, indicate that Spanish speakers do engage in manner-related thinking during acts of motion event description in the type of narration task we use. Our overall results provide reasons to question how severe the constraints may be on conceptualization of manner in Spanish. The results of the follow-up study also call into question any claim that the manner gestures of the speakers in the main study are due solely to having visually processed the action-packed cartoon. These results in fact comport with our proposal concerning the nature of conceptualization of manner in Spanish narrative discourse; that is, that it links in some way to the Spanish speaker's conception of the setting or ground with respect to which a figure's motion occurs.

That there may exist an intrinsic relationship between manner and ground should not be an entirely alien notion to English speakers. The relationship is lexically encoded in English manner verbs such as *dodge*, *slog*, *trek*, and *slide*. The overall tendency of English, however, may be to associate manner with figure (McNeill 2000). Neither, we would say, is this proposal of a manner-ground linkage in Spanish at odds with the contrasts between Spanish and English,

[8] Juan Pablo Mora, PhD, of the University of Seville, Spain, collaborated in running this follow-up study and in interpreting the results.

considered in their entirety, that Slobin has reported (1995, 1996). Specifically, he notes that, where the grammatical and lexical resources of English promote expression of manner and complex paths, the same resources in Spanish promote elaboration of reference to settings. This is where our gesture data and our proposed linkage between manner and ground seem relevant to linguistic theories of meaning. In elaborating on the ground or settings in which a particular motion event take place, the Spanish speaker simultaneously builds a conception of the manner of motion that must be involved. This is how we explain the within-Spanish-language difference between descriptions of the events of 'rolling' and 'climbing.' The cartoon depiction of 'rolling' includes elements of the cartoonist's imaginative distortion of reality, resulting in a stimulus event meeting Slobin's criteria for an "exceptional manner" (1998:6), likely to elicit a manner-expressive verb from Spanish speakers. In our terms, the difficulty for the Spanish speaker is that there is no linguistically-specifiable figure-ground relationship from which the cartoon cat's manner of motion could be the emergent result.

A theoretical issue is whether to interpret the fact of speech-synchronous manner gestures in Spanish as informative concerning the Spanish thinking for speaking process itself; indeed, of gesture generally as informative concerning the nature, generally, of thinking for speaking. To assert that gesture *is* informative is in keeping with the theoretical and methodological rationales that motivate much current cross-linguistic research in this area; namely that, "gesture and its synchronized speech express the same underlying idea unit. […] By looking at the speech *and* the gesture jointly, we are able to infer characteristics of this underlying idea unit that may not be obvious from speech alone," (McNeill and Duncan 2000:143). In this formulation, image processing is hypothesized to be inseparable from processing of the spoken linguistic unit(s). The alternative is to interpret gesture as instead a manifestation of some other visuo-spatial cognitive process. Given the facts of speech-gesture synchronization, this would have to be a process that runs concurrently with thinking for speaking about motion events, but is somehow separate from it. The notion that gesture results from a process such as this accords with Hadar and Butterworth's (1992) claim that gesture comes from visual imagery via a "direct route." Gesture is, in their words, "the motor manifestation of imagistic activation."

A weakness of formulations that rely on a 'direct visual route' and a semantic compensatory function of gesture is their inability to explain why the temporal co-occurrence of productions in the two modalities is non-random and so precise. A proposal that there is some kind of semantic 'synchrony,' or congruence, between manner and ground, has the virtue of acknowledging the data on temporal synchrony. Nor can 'direct visual route' or compensation explain the occurrence of a Spanish-specific gestural form, the 'corkscrew.' In general, these formulations are limited in their ability to account for systematic, cross-linguistic differences in gesture timing and gesture forms. For that matter, systematic *within*-language differences in form and timing are also a challenge (Duncan, in press). These limits flow from the fact that these formulations have, in important respects, little to work with beyond human hands and human vision. Consider the 'corkscrew' gestural form. It is problematic to adopt the position that the English or Chinese speakers in our sample have limitations on their ability to move their hands in this way. It would be similarly problematic to claim that Spanish speakers' visual perception of the cat's ascent is unique in a way that contributes to the formation of this special gesture form. For the particular phenomena of gesture-speech association that we are attempting to account for here, we believe

that an explanation that specifies significant semantic integration of the two modalities best fits the data. We do not provide a theory here of how grammatical or lexical structures of spoken Spanish achieve this congruence. We note only that our data on synchrony and gesture form point to an account that specifies a conceptual linkage between manner and ground in motion event expression.

9. Conclusions

Researchers often pose the question: who are gestures for, the speaker or the listener? With respect to the account we have offered for the manner-expressive gestures of Spanish speakers, we note that gestures are for linguists. This is not meant facetiously. A message emerges from a comparison of the results of the main and follow-up studies reported here. It is that, while for native Spanish speaker-listener pairs, the spoken language itself provides data sufficient for inferences concerning manner of motion, for *non*-natives (linguists) observation of speech-synchronous gesture may be an additional necessity. Without such observations, we underestimate the extent of manner conceptualization during acts of motion event description; also, we are hampered in understanding how manner is integrated with motion event conception as a whole.

We learned that manner gestures are equally frequent in the three languages, which argues against gesture-speech compensation. The alternative mentioned in the Introduction, that gesture and speech jointly highlight manner content, is not a claim that thinking-for-speaking with regard to manner is cross-linguistically invariate. We concur with Slobin (1998:2) that,

> […] descriptions of manner of—in various sorts of discourse—are to a large part determined by the *lexicalization patterns* of the language; and, as a consequence, thinking for speaking varies systematically on the basis of such patterns." (Emphasis in original.)

What we propose is that the systematicity of the variation across Spanish and languages like English and Chinese in manner conceptualization is not of the less-*versus*-more variety. Rather, it is variation with respect to the dynamic interplay of the various components of motion during formation of utterances that are both richly expressive and rhetorically appropriate.

Further examination of the expression of components of motion in gesture, along the lines of Slobin and colleagues' extensive and detailed analyses of speech in natural discourse contexts, is needed before the hypothesis offered here is solidly supported. We hope we have persuaded some concerning a methodological point; namely, the value of very close assessments of gesture-speech temporal and semantic synchrony. This is one of the important innovations of the Kendon (1972, 1980) and McNeill (1992) research paradigms. We believe that such analyses have great potential for studies hoping to make theoretical claims regarding the role of visual and mental imagery in language production, the significance of gesture data in assessments of speaking-associated conceptualization, and the way languages structure meaning.

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